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Darius Davison's Patent Coal Gas Retorts.

By a visit to Mr. Davison's office, No. 4 Dey street, in this city, we have obtained some statements in regard to his improvement for the manufacture of coal gas, which we are now privileged to first publish, for general information.

A front view of three of the improved retorts is shown on this page. They are designed to be set in benches of three only, thus giving each retort a straight large stand pipe, of easy access and free passage of gas from each retort. More gas is claimed in twenty-four hours from a bench of three of these retorts, than from a bench of five of the present retorts. A bench of three improved retorts costs less than a bench of five ordinary retorts. The retorts are made of either iron or clay. It requires less fuel to run them. Each retort rests on a separate flat base, and all are heated to an equal temperature, so as to effect a uniform action and result in each retort, in the conversion of the vapor evolved from the coal, into a rich, permanent gas. A bench of three has been run continuously for eight months in a gas works.

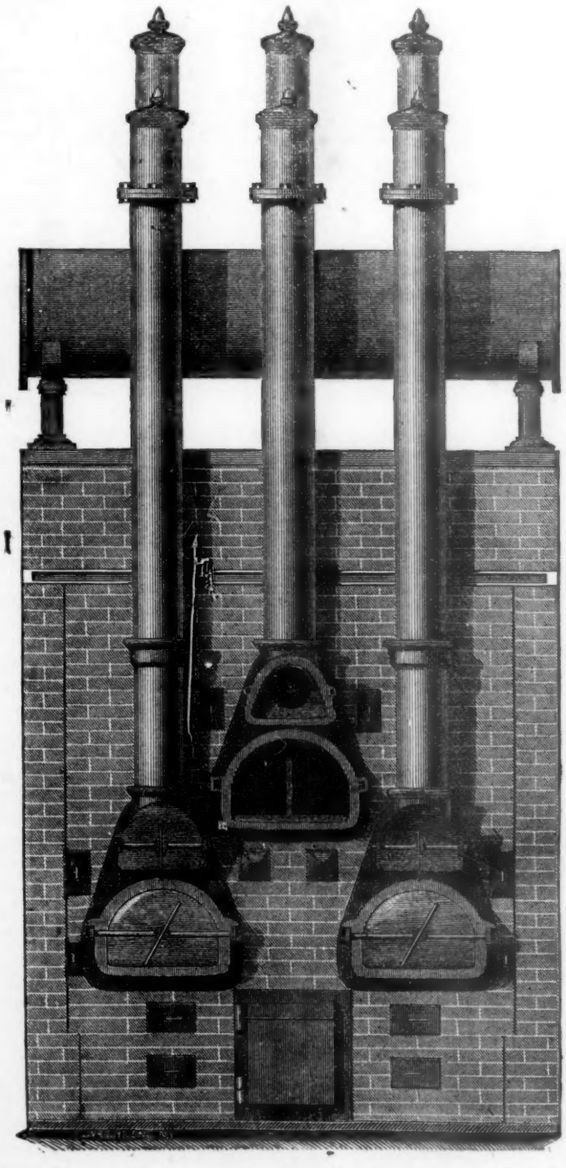
With these retorts, when an exhauster is used, 3,000 more feet of gas is claimed from a ton of coal than can be obtained with the ordinary retorts.

By the process of distillation, construction and operation of these retorts, no gas issues from them of less than ten to twelve candle power at the lowest point of distillation; average illuminating power from Westmoreland coal at least seventeen candles.

These retorts are set in the ordinary ovens in place of the present retorts, and are operated with the usual implements, and the ordinary labor now employed in gas works.

Any gas coal can be used, and it is placed in the retorts to produce the results stated, without adding to it, or taking from it any substance whatever.

The coke produced is the same in quantity and quality as obtained from any coal by the ordinary retorts.



The gain in quantity and quality of the gas made by these retorts, is attributed to conversion of more of the carbonaceous vapor distilled from the coal into gas, when first evolved, in its *nascent state*, by its more thorough circulation and evolution in the hot retorts before it can pass out of them, thus reducing the amount of carbonaceous vapor condensable from the gas made, into the coal tar. By these retorts the coal tar is reduced to from five to six gallons from a ton of coal. The excess over that amount, now made by the present retorts, being by the operation of the improved retorts, converted into permanent, brilliant burning, illuminating gas.

It is a well known fact, that the heaviest and most luminous burning carbonaceous vapor distilled from the coal, with the present retort, is not converted into gas before it passes out of them, and is consequently condensed from the gas, and forms the chief part of the liquid in the large amount of coal tar now made from the distillation of a ton of coal. It is therefore lost in the operation for conversion into gas.

From the above statement of practical results obtained, an idea of the value of these improvements can be gained when generally used, and is further illustrated by an estimate of their productive value to the gas works in the city of New York.

Say 25,0000 tons of coal are distilled annually in the city of New York, and that 3,000 more feet of gas is made from each ton of coal, that would produce 750,000,000 more feet of gas from that amount of coal; $3 per thousand feet of gas, would make for the New York city companies $2,250,000! more clear receipts, annually, than they now obtain from distilling that amount of coal.

It would therefore seem that these inventions will work a *complete revolution* in the manufacture of gas, and overturn the idea of the practicability, expediency, or economy of any further efforts to make gas from naphtha or water for public gas works.

It is a radical improvement, adapted to immediate use in any gas works, and yet of a simple and entirely practical character.

Further information can be had from Mr. Davison's advertisement on page 57 of this Journal, or at No. 4 Dey street, New York.

A New Gas Apparatus, an account o which has just been published, has its ascension pipe, instead of dipping into the hydraulic main by means of a bend or H-pipe, inserted through the bottom thereof, and is furnished with a cap or cover suspended over it, but which rests on the top of it, and dips into the liquid contained in the hydraulic main when the apparatus is not in action, thus forming a seal. The cap or cover is hung by a rod passing through an aperture in the hydraulic main, and is attached to a chain which travels over a pulley and termin. in a counterbalance. Pipes are attached at or near each end of the hydraulic, for supplying it with liquid, and for conveying away any superfluous tar or liquid that may collect.—*American Artisan.*

Chemical Repertory.

No. 64.—February 16, 1872.
EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

161. The Milanese Sewerage System.—This is recommended by a recent writer, as suitable for small towns and country villages. Its essential feature is the drainage of the houses into water tight cesspools, which are emptied frequently, efficiently, and quite inoffensively by means of a barrel cart, previously exhausted of air, and a hose. The barrel-cart then conveys the sewage to a depot at a convenient distance, where all that is saleable is sold to farmers, and the rest is manufactured into a kind of dry artificial guano. Many towns and villages lie on dead flats or at the bottom of deep valleys, where ordinary sewerage works could not be established without an expensive provision for raising the sewage in order to render it available for irrigation. In such places the Milanese system might be carried out with ease and at comparatively small outlay. A certain number of cesspools must be rendered water-tight—a process not very expensive. One cesspool would serve for several cottages, and frequent emptying would be better than large size. Two Milanese barrel-carts must be procured, and these, with a small steam-engine at the depot to work the air-pump, would, together with about three men and two horses, form the whole of the apparatus required for testing the system upon a small but sufficient scale. On the day on which this writer visited the depot near Milan, farmers' carts were waiting there literally in scores to obtain their supply of manure.

[In recalling that this identical plan has been largely tried many years since in some of our American cities, and abandoned, we do not want to imply any condemnation of it. The trials may have been merely premature. Nevertheless, our sanitary objections to all kinds of "pouderette" have been before given.—Ed.]

162. Chemical Achievements.—What would the great father of British chemistry have said, had he stood in the lecture room of the Royal Institution, where his great discoveries were made, and seen the burning hydrogen extracted by our great countryman Graham, from a meteorite, the heat and light of another world; or could he look with Lockyer on the burning flames of hydrogen, which dart up from the sun to a height of 50,000 miles, or could he read the flashing telegrams which so rapidly run around the world, that our notions of time are completely upset, and we actually receive intelligence to day which was sent to-morrow?—*Exchange*

163. Absorbent Powers of Charcoal.—Dr. Hermann Vohl, of Cologne, has lately published an elaborate paper in the *Archiv der Pharmacie*, upon the absorbent power of charcoal and its application for disinfecting and deodorizing purposes, replete with suggestions of great importance.

Among other deductions from his experiments, he states that the carbonic acid gas obtained by heating charcoal is not derived from the coal itself, but has been absorbed from the atmosphere, and is held with such tenacity that it cannot be driven out by boiling in water, but that a temperature much below that of ignition is sufficient to expel it. This conclusion is the same as that which had been reached by another experimenter, to which we have previously made reference. Among other facts proving this statement, Dr. Vohl remarks that when charcoal has been once freed from its carbonic acid and saturated with pure oxygen, no trace of carbonic acid is appreciable, even when heated to a temperature of 680° Fah.—*Scientific Press.*

164. Illuminating Gas From Anthracite.—The miners of the Taylorville Shaft of the Delaware, Lackawanna and Western Company, in the progress of their mining operations, struck a gas well, which emitted such a volume of gas that they were obliged for a time to suspend work, it being dangerous to use their lamps in the chambers. The Company at once set to work to get rid of it, and in so doing constructed a tank in which to confine the gas and use it in lighting the mines. Pipes have been laid and now the chambers and gangways are lit by it. Still the amount is greater than can be consumed in the mine, and consequently they have been compelled to run a pipe up the shaft to the surface, where it is burned, making a bright light, which is of great service at the depot of that place. This is undoubtedly a natural gas well, which would furnish illuminating material for an entire city.—*N. Y. Times.*

165. Well-Waters, and Burial-Grounds.—J. Lefort.—By a French decree, of March 7th, 1808, it was enjoined that no wells shall be bored or dug out at a less distance than 100 metres in all directions from any burial-ground. The author, having found that not only in many country villages but also in several towns this regulation has not been observed, made some experiments on the water of a well at Saint Didier (Department de l'Allier.)

This locality is situated on an alluvial soil; this water is used for drinking purposes by the parish priest and a portion of the inhabitants, and, on examination, the author found it to contain not only a large proportion of ammoniacal salts but also, on evaporation, to leave a very large quantity of a dark colored organic matter mixed with carbonated salts, which, on being mixed with hydrochloric acid, gave off an offensive carbonic acid gas, the smell being somewhat akin to a mixture of a concentrated solution of glue and butyric acid. The well is very deep, and the water is quite clear and bright, but exhibits, especially in summer time, a very vapid taste, while, in the warm season of the year, it rapidly becomes putrid. The author comes to the conclusion that, in any soil, a distance of 100 metres (328 feet) from either burial-grounds or battle-fields is quite useless to protect the water of even deep wells from becoming contaminated with organic and other injurious matter, it is imperatively necessary to make new and sound regulations on this subject, so as to avoid wells (for obtaining potable water for domestic use) being sunk without a stringent inquiry as to where the water comes from, and through what strata of soil it may have to pass.

[Sanitary considerations of the most vital importance are here involved, relating to other things far more abundant than burial-grounds. Villages in this country, we are persuaded, owe their frequent liability to certain desperate diseases to the almost universal contamination of wells by drainage-poison, just as Dr. Wallace (as quoted by us the other day) has shown in Scotland. One large suburban district, near New York, has been for some years under the writer's observation, in which the progress of this destructive agency, growing with its growth, has been manifest to him beyond all peradventure.—Ed.]

166. Copal.—Contrary to what is generally supposed, there is but very little copal found upon the Island of Zanzibar itself, and the little which is found is very inferior in quality and does not enter into trade. Moreover, there are copal-producing trees still growing on the island, and in various parts of West Africa, particularly in the interior whence the raw copal is brought by the natives, but the fresh and unfossilized gum obtained from these is nearly valueless, and when mixed with the fossil gums, as is often done by the natives for the purpose of adulteration, it is always rejected by experienced buyers.

The great bulk of the fossil copal, which alone is merchantable, comes from the adjacent shores of Africa, where it is found principally in a long strip of coast land, having an extent of two or three hundred miles in length, and extending inland to a distance of about twenty-five miles. This section of the East African coast land is called the Mrima, and it is in the sand of this low and desolate tract, in which there are no inhabitants, and but little vegetation that the Zanzibar copal is found.—*The Hub.*

167. What Next? The Romance of Stupidity!—The fame of the exploder of the Metropolitan Purifying House must yield. Jan. 12th it is stated that a man contrived to "blow his head to atoms" with a beer barrel. The tale is thus:

In a Long Island brewery, Frank Gilram, an employee in the establishment, had his head blown to pieces by the explosion of a beer barrel. Gilram and Michael Quinn were engaged in cleaning barrels, which is done by filling the vessel with hot water and slacked lime, and then rolling it about in order to generate the gases. While they were thus engaged, a barrel which they were rolling exploded with a loud report, hurling the fragments in every direction. One of these pieces struck the head of Gilram, severing it from the body, and dashing it against the beams of the room so violently that it was crushed into a mass of blood, flesh, and bone. Quinn was hurled to a distance of about twenty feet, where he laid in an insensible condition, but was not seriously injured. Gilram resided at No. 64 Union street, and leaves a wife and children.—*Times.*

168. The Coal Question.—Organization for a new Company—Formidable opposition the probable result.—Scranton, Pa., Jan. 16.—The Central Railroad of New Jersey have bought the coal lands of the Honey Brook Coal Company and the German Pennsylvania Coal Company, at Audenried and Trescow, and are negotiating for other lands at Jeansville. This company, by these purchases of coal tracts, will be a formidable competitor with the Lehigh Valley Road for the transportation of coal from the Lehigh and Wyoming coal-fields.—*Times.*

169. One More Unfortunate.—The *Evening Mail* "norates" that a mouse in Belfast, Maine, was found, the other day, frozen stiff upon a hammer. Investigation showed, that in picking up something that lay on the iron head of the hammer, the tongue of the mouse had frozen to it, and, being unable to get away, it died.

170. Ambitious Desires.—The London *Mechanics Magazine*, advertises the following:

"*Wanted* a prime-mover to supersede the present steam-engine, either by the use of electro-magnetic force, petroleum, compressed air, or other agencies, or a better employment and application of steam itself, alone or in combination—to economize coal.

"*Wanted* a method of illumination that shall supersede coal-gas, or, at least, economize its use—and economize coal.

"*Wanted* a system of generating heat and applying the same to the warming of dwellings, and the cooking of food, that shall utilize at least a fair proportion of the heat developed by combustion, and not let the bulk thereof be dissipated wastefully—to the same end, the economy of coal."

[All this is well; but why not go a little further. Is there not also:

Wanted; a cheap infusible, malleable and ductile metal, which is a non-conductor of heat and incombustible.

Wanted; a solid material, possessed of great cohesion and strength, without ponderability, whence flying machines will follow.

Wanted; a transparent solid, malleable without loss of transparency at ordinary temperatures.

Wanted; a medium which will screen or arrest magnetic force, whence *perpetual motion*; and so on, *ad infinitum*.—Ed.]

171. The Force of Fire.—Probably the biggest clinker ever known in the history of man is that now in the cellar of a formerly extensive stove store of River Street, Chicago. About 9,000 stoves were melted down by the great fire into one mass, which, gathering into it an immense quantity of bricks and stones, presented, when cooled off, one of the most formidable masses of *debris* occasioned by the fire. Every endeavor to break it up by any ordinary means having failed, one of Fox & Howard's immense pile-drivers was employed for that purpose, but even its huge hammer has so far, after four weeks hard work, proved ineffectual. The hammer of the first "driver" has been completely smashed up in its vain endeavor to conquer the stubborn clinker, and now a new machine of this character has been set to work. It must be several weeks yet before this obstruction to rebuilding can be removed.—*Am. Artizan.*

172. Cooking Food Below 212° F.—Dr. Jeanel.—From a series of experiments, it appears that food (meat as well as vegetables) boiled at 200° is more nutritious and of better flavor than when boiled at or above 212°. The author illustrates this point by what takes place in mountain localities (every 100 metres' rise above the sea level makes a difference of 0.6 deg. less in the boiling-point of water); as, for instance, at Potosi (Bolivia), at 4061 metres above sea-level, and an average barometer reading of 454 m.m., the water boils at 187° at Mexico, 2277 metres above sea level, 568 m.m. barometer, water boils at 198°; at Briancon (France). 1321 metres above sea level, 643 m.m. barometer, at 194°, also by the action of the so-called Norwegian cooking apparatus.

173. A Sensible Stove.—On the last German Arctic Expedition preparing to set out for the North Pole, Capt. Coldevey made a public appeal for a stove which should suffice for the needs of so cold a climate. Of the various patterns submitted to him, the one invented by Prof. Meidinger, of Carlsruhe, was pronounced the best. It has stood the test, and having done excellent service on board ship, now begins

gradually to insinuate itself into German households. Nothing can be more simple than the construction of excellent apparatus.

It is an iron stove having a double wall, with a space about two inches wide between the outer and the inner one, to which the air has free access above and below. The cold air being always at the bottom, and the warm air ascending, it follows that all the air in the room is being constantly forced through the space between the outer and inner covering of the stove, or, what is the same, is being constantly heated. Connected with this is another ingenious device. The coal is put in from the top, and fills the whole inside of the stove, which is about six feet high, more or less. It is then lighted from the top, and kept burning by the draught created by valves inserted both into the side walls and at the bottom of the stove. The more valves opened the greater the heat, so that the temperature of a room can be regulated to a nicety. At the same time the outer wall, being at a distance from the inner one, never reaches the excessive heat, so great an objection in ordinary iron stoves. The expense of fuel is about a third of that incurred in a porcelain stove as used in Germany, and one-sixth of an English fire-place.—Lond. *Mining Jour.*

174. Simple Relations between Pressure of Aqueous Vapor and Temperature.—Dupenay.—The pressure of aqueous vapor is sensibly proportional.

1.	From	10°	to	24°	to the	1st.	power of the temp.
2.	"	25°	to	50°	" "	2d.	" "
3.	"	51°	to	96°	" "	3d.	" "
4.	"	97°	to	230°	" "	4th	" "

Whence the following laws:

1. "The pressure on each square square centimeter in kilograms, from 25 to 50 degrees is sensibly half the square of the temperature."

2. "The pressure on each square centimeter, in kilograms, above one atmosphere, is sensibly the fourth power of the temperature."

[The degrees are Centigrade.]

175. Cheap Dextrine.—A foreign writer gives the following directions for preparing pure gum substitute or dextrine:

Five hundred parts of potato starch are mixed with 1,500 parts of cold distilled water, and eight parts of pure oxalic acid, and this mixture placed in a suitable vessel on a water bath, and heated until a small sample tested with iodine solution does not produce the reaction of starch. When this is found to be the case, the vessel is immediately removed from the water-bath, and the liquid neutralized with pure carbonate of lime. After having been left standing for a couple of days, the liquor is filtered, and the clear filtrate evaporated upon a water-bath until the mass has become quite a paste, which is removed by a spatula, and, having been made into a thin cake, is placed upon paper, and further dried in a warm place. Two hundred and twenty parts of pure dextrine are thus obtained.—Dr. Walz, in *Manuf. Review.*

176. Diamond Rock-Boring.—One of the Cleveland (England) ironstone companies is at present engaged in prospecting for ironstone, with a view to sinking a shaft, and has employed Capt. Beaumont's diamond boring apparatus. The work was commenced on October 7th, and the depth reached already is more than 650 feet. For two days, working during daylight anly, the boring tool passed through 50 feet of rock. The diamonds are so arranged in the crown as to cut a clean circular groove round a core of one inch in diameter, which is brought up from time to time, and shows exactly the nature of the strata perforated. The power is applied continuously, and the wear and tear, as well as the complications involved in percussive action, as in the case of the Mont Cenis Tunnel, are avoided. The success of this new method of boring is expected to exercise an important influence on mining operations.—London *Mining Jour.*

New Gas Company at Albany.—The new gas company organized last evening by electing the following officers: President, Richard Merrifield; Vice-President, Smith Briggs; Secretary and Treasurer, Nathan D. Wendell. The books for stock subscriptions will be open in a few days at the Merchants' Bank. A site for the new gas works has been selected, and negotiations are pending.—*Albany Times, Feb.* 7.

The year 1871 has been highly prosperous in the oil regions of Pennsylvania. There has been a uniform paying flow of oil.

A Lecture on Water.

By Charles F. Chandler, Ph. D.,

At the Academy of Music, New York, Jan. 20, 1871.

[Reported stenographically by S. J. Borrows, Esq.]

[Abstract by the Editor of this Journal.]

[Continued from page 35.]

Saline Waters.

The chlorides of sodium, calcium and magnesium often occur in spring waters in such quantities as to cause a decided saline taste; agreeable in the case of the first mentioned salt, if not too intense, but bitter and disagreeable when caused by either of the others.

Sulphate of soda (Glauber salt) or of magnesia (Epsom salt) may also be the cause of a saline taste. Brines, which are important sources of national wealth in many countries, belong to the first mentioned class. Nearly all the salt manufactured in the United States is obtained from salt springs or wells.

Acidulous Springs.

Waters charged with such quantities of carbonic acid as to cause them to sparkle and effervesce as they flow from the spring, are called *acidulous*. Owing to the solvent power of this acid upon limestones and some other rocks, such waters generally hold considerable quantities of lime, magnesia and iron in solution in the form of bicarbonates; when the latter is present in quantities of a grain or more to the gallon, the spring is called a *chalybeate*, from the name of an ancient people who worked in iron at an early day, the *Chalybes*. These waters often contain considerable quantities of chloride of sodium, and frequently bromide and iodide of sodium, as well as bicarbonates of soda and lithia.

Such is the character of the most celebrated mineral waters in this country, the well-known springs of Saratoga and Ballston in this State. These waters are so well known to you that I will take the liberty of dwelling upon their peculiarities for a few moments. In the first place I will call your attention to this section of the Saratoga valley, which shows you the position of the rocky strata there.

The most remarkable feature is the break, or vertical fissure which occurs in the Saratoga valley, which you see indicated on my diagram. I want you to notice, specially, the fact that the strata on one side of the fissure have been elevated above their original position, so that the Potsdam sandstone on the left meets the edges of the calciferous sand rock, and even the Trenton limestone, on the right. It is in the line of this fissure, or *fault*, in the towns of Saratoga and Ballston, that the springs occur.

Geological Section at Saratoga Springs.

The Laurentian rocks consisting of highly crystalline gneiss, granite and syenite, are almost impervious, while the overlying Potsdam sandstone is very porous, and capable of holding large quantities of water. In this rock the mineral springs of Saratoga probably have their origin. The surface waters of the Laurentian hills, flowing down over the exposed edges of the Potsdam beds, penetrate the porous sandstones, become saturated with mineral matter, partly derived, perhaps from the limestones above, and are forced to the surface at a lower level, by hydrostatic pressure. The valley in which the springs all occur indicates the line of a fault or fracture in the rocky crust, the strata on the west side of which are hundreds of feet above the corresponding strata on the east.

The mineral waters probably underlie the southern half of the entire county, many hundred feet below the surface; the accident of the fault determining their appearance as springs in the valley of Saratoga Springs, where, by virtue of the greater elevation of their distant source, they reach the surface through crevices in the rocks produced by the fracture.

The High Rock spring is the greatest natural curiosity of the county. It was well known to the Indians, who highly prized the medicinal virtues of its waters. The Indian name Saraghtoga means *place of salt*. In 1767 they brought Sir William Johnson to the spring on a litter. The spring rises in a little mound of stone, three or four feet high, which appears like a miniature volcano, except that sparkling water instead of melted lava flows from its little crater. When Sir William Johnson visited the spring, and in fact until quite recently, the water did not overflow the mound, but came to within a few inches of the summit; some other hidden outlet permitting it to escape. The Indians had a tradition, however, which was undoubtedly true, that the water formerly flowed over the rim of the opening.

A few years ago the property changed hands, and the new owners, convinced that by stopping the lateral outlet they could cause the water again to issue from the mouth of the rock, employed a number of men to undermine the mound, and with a powerful hoisting derrick to lift it off and set it one side, that the spring might be explored. If you will examine this diagram which presents a vertical section of the spring, you will be able to form an idea of what they found.

Acid Waters.

It occasionally happens that springs are characterized by the presence of free mineral acids, such as sulphuric and hydrochloric. The Rio Vinagre, in South America, is supplied by such springs; and it is stated that this stream carries to the ocean daily an amount of acid equal to 82,720 pounds of oil of vitrol, and 69,638 pounds of concentrated muriatic acid. There is a celebrated spring of this character in New York State, known as the Oak Orchard acid spring.

Borax Waters.

Minute quantities of borax (biborate of soda) are found in many mineral waters; as, for instance, the waters of Saratoga; but in a few localities waters occur so heavily charged with this salt as to make it worth while to extract it for manufacturing purposes. For many years considerable quantities of borax, called tincal, were brought from a salt lake in Thibet. More recently, California has thrown down the gauntlet by developing borax lakes of great size, in which occur enormous quantities of this valuable salt. No complete analyses of the waters of these lakes has yet been published; but, according to G. E. Moore, the water contains 535 grains of borax per gallon.

Silicious Waters.

Almost all natural waters contain small quantities of silica, in the neighorhood of one grain in a gallon; but the waters of hot springs, especially those which contain alkaline carbonates, are largely charged with silica; and in the neighborhood of their outlets, large masses of silicious tufa are formed.

Tre water of the famous Geyser in Iceland, contains twenty-four grains of silica in the gallon. This fragment of silicious tufa which I hold in my hand is from one of the hot springs of the Azores.

There are wonderful geysers in California, and quite recently a region in Montana, on the Upper Yellowstone, has been explored, in which from 1000 to 1,500 hot springs occur. One of these, the "Grant" geyser, throws a column of hot water eight feet in diameter to a height of over two hundred feet at regular intervals of thirty-two hours, while others are in almost constant operation.

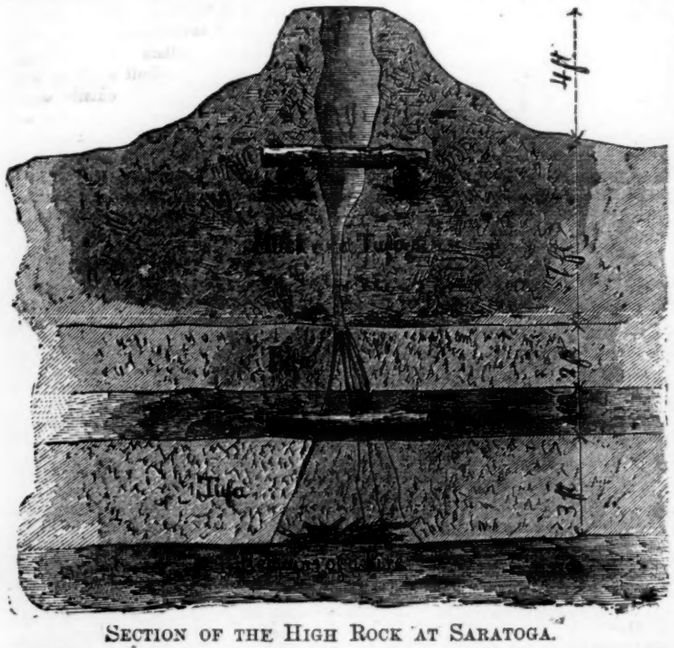
Water for Manufacturing Purposes.

For manufacturing purposes, pond or river water is generally selected, not only because it can generally be obtained in unlimited quantities, but also because it is generally softer than spring water.

For many purposes the impurities of waters are often seriously objectionable. When used in stationary or locomotive boilers, impure water produce incrustations which often form a complete lining. I saw 1,300 pounds of calcareous incrustation taken from the boiler of a single locomotive on the New York Central Railroad.

These stony masses which I hold in my hand, and which you see are from one to two inches in thickness, are incrustations from boilers, fed with hard water. These incrustations are very poor conductors of heat. Their presence in boilers, causes, therefore a great waste of fuel. It is estimated by the French engineers

that 45 per cent. of the fuel burned under locomotive boilers, is required to overcome the non-conducting power of the incrustations. Furthermore these scales prevent the contact of the water with the plates of the boiler, the metal becomes therefore overheated, and is rapidly burned out, making frequent repairs necessary. Boiler explosions are sometimes attributed to the presence of incrustations; the metal becoming very much overheated, causes the scale to crack, which permits the water to come in contact with the hot metal; a great quantity of steam being at once generated, the boiler is burst. These incrustations vary somewhat in character with the impurities of the waters by which they are produced. Their chief constituents are carbonate of lime, carbonate of magnesia and sulphate of lime.



SECTION OF THE HIGH ROCK AT SARATOGA.

Various substances are employed to prevent the formation of these incrustations in boilers, some of which are very effective. Amylaceous, saccharine and extractive matters tend to prevent the carbonates of lime and magnesia from forming a hard scale, causing them to separate as a loose mud, which can be easily washed from the boiler at convenient intervals. Potatoes, molasses, extractive matters, or substances which yield them, as logwood sawdust, are consequently employed with varying success. Astringent substances, which contain tannic acid, have a similar action. To this class belong catechu extract, oak sawdust, tan bark, etc. Solid particles, as sawdust, clay, chopped straw, etc., serve to diminish the formation of hard scale by presenting nuclei, upon which the earthy carbonates are deposited. For the decomposition of sulphate of lime, carbonate of soda or chloride of barium are employed. Sal ammoniac is sometimes employed to convert the carbonate of lime into soluble chloride of calcium, and thereby prevent its being deposited. The substances which I have enumerated are placed in the boiler from time to time and allowed to act there. An English chemist, Mr. Clark, proposed purifying the water beforehand by adding lime water, on the principle of *similia similibus curantur*. The carbonate of lime in the water is held in solution by carbonic acid as a bicarbonate. The lime, which Mr. Clark adds, takes this extra carbonic acid, forming an insoluble carbonate, and at the same time precipitating the lime of the bicarbonate as an insoluble carbonate. The magnesia present is also precipitated by the lime water; but the sulphate of lime, which forms the hardest and most crystalline incrustations, is not removed by this process. The real objection to this process arises from the vast quantities of water required in practice. A locomotive consumes on the average about forty-five gallons of water for every mile that it runs, and on the New York Central railroad alone about 300 locomotives are employed. As at least twenty-four hours are required to enable the precipitated lime to settle from the water, enormous reservoirs or tanks would be required to contain a sufficient supply for a railroad.

Dr. Frankland stated in his examination before the Parliamentary committee on the London water bill, that all the water supplied to Canterbury, Tring and to the Military Hospital at Woolwich, is purified by this process, at a cost of about $3.00 per million gallons for the lime.

An excellent device has been patented by Stillwell, to be used in connection with stationary boilers. It is simply a box containing a great number of horizontal shelves. The water for supplying the boiler passes through this, and the exhaust steam from the engine is also admitted to it. The exhaust steam causes the water to boil, and most of the lime, which it contains in the form of bicarbonate, separates as insoluble carbonate, lodging on the shelves or being caught by a filter of straw at the bottom of the box.

Great annoyance was formerly experienced by marine engineers, whose boilers were fed with sea water. Not only was there formed a very hard strong scale of sulphate of lime, often an inch or more in thickness, but even the salt separated, sometimes entirely filling the spaces between the tubes. By noting the density of the water in the boiler with a hydrometer, and blowing out a portion of the concentrated sea water from time to time, the engineer was able to prevent the separation of salt; but the separation of sulphate of lime could not be prevented. This became so great an evil, causing the very rapid destruction of the boilers, that the use of sea water had to be abandoned. Marine boilers are now provided with condensers, by which the steam, after doing its work in the cylinder, is condensed to water again and returned to the boiler. A supply of fresh water is taken on board before leaving port, and is used over and over again, until the vessel reaches her destination.

Often for washing or for cleaning cotton, wool or other fabrics, the impurities of water are a great objection; they destroy soap, they affect colors in dyeing; for sugar refineries and in brewing, the character of the water is of great importance. In fact the highly prized flavor of some of the English ales, is attributed facetiously to the impurities in the water used.

[To be continued.]

On the Physical Properties and the Calorific Power of some Petroleums from the Russian Empire.

The petroleums examined were from the province of Bakou, near the Caspian Sea. They were: (1.) Crude naphtha from the Balchany wells, sp. gr. 0·882; (2.) Residuum from the Bakou stills, sp. gr. 0·918; (3.) Black oil from the Weyser refinery at Bakou, sp. gr. 0·897; (4.) Light oil of Bakou, sp. gr. 0·884; (5.) Heavy oil of Bakou, sp. gr. 0·938. On distillation they afforded:

Temp.	1.	2.	3.	4.	5.
Vol. at 100°c	1·0 p.c.	—	—	—	—
" 140°	—	—	—	2·7 p.c.	—
" 160°	5·0	—	—	7·0	—
" 180°	9.3	—	—	13·3	—
" 200°	14·0	—	2·3 p.c.	—	1·0 pc
" 220°	15·3	—	—	19·0	1·3
" 240°	—	1·0 p.c.	8·0	23·3	1·7
" 260°	29·0	2·3	14·0	29·3	3·0
" 280°	37·0	4·3	22·3	36·7	6·0
" 300°	41·3	7·7	33·7	73·3	9·7

Their composition was given by analysis as follows:

	1.	2.	3.	4.	5.
Hydrogen	12·5	11 8	12·0	13·6	12·3
Carbon	87·4	87·1	86·5	86·3	86.6
Oxygen	0·1	1·2	1·5	0·1	1·1
	1·00	1·00	1·00	1·00	1·00

From these data their calorific power was calculated and compared with that obtained by experiment in the petroleums marked 4 and 5. The results are thus given in calorics:

	1.	2.	3.	4.	5.
Cal. power calc.	11370	11090	11060	11660	11200
Cal. pow. obs'd.	[11070]	[10700]	[10760]	11460	10800

Numbers 1, 2, and 3, were calculated from the results in 4 and 5. These results show the Bakou oils to be superior to those of America and Europe, for heating purposes.—*Sainte-Claire Deville.*

The Mutual Gas Works.

We copy the following article from the Albany *Evening Times* of February 8th, as matter of current interest:

[From the New York Sun, Feb. 8.]

An interesting event for New Yorkers is the completion of the immense and splendidly constructed works of the New York Mutual Gas Company, situated at the foot of Eleventh street. The contractors, Messrs. Hoy, Kennedy & Co. having done their duty, resigned charge of the works, and gave them into the hands of the directors.

Among the officers of the company who were present were Cornelius Vanderbilt; Commodore Garrison, Major Hoy, Senator Labeau, Charles Place, Seligman the banker, George Opdyke, and others equally well known; and there were many invited guests who had come to inspect the works.

Speeches were made by the directors, and among other things it was said that as soon as the frost is off the ground, 1,000 men are to be set to work to lay 100 miles of pipe through the city; and this pipe is to run side by side with that of the other city companies. The Mutual is to form no combination with any other company; on the contrary, it is to wage war to the knife against one and all of them. It has $100,000,000 of capital to rest upon; promises to make gas 100 per cent. better and 30 per cent cheaper than any other company; and as soon as the weather permits, is going to sound the note of war.

To the Editor of the Albany Evening Times.

Sir: As our citizens are somewhat interested in the above notice, so far as cheap gas is concerned, it may not be uninteresting to the public to know that the process adopted by the New York Mutual Gas Light Company, is the same as is proposed to be used in this city by the "Illuminating Gas Light Company," provided the Common Council will give them the same privileges granted to the People's Gas-Light Company last Monday evening.

This process cannot be humbug, as any person will see by glancing at the names of the men that were present at the meeting in New York; Commodore Vanderbilt, Cornelius K. Garrison, and George Opdyke have not accumulated their millions by investing largely in humbugs. The process was thoroughly tested before these gentlemen invested one dollar in it. They were convinced that if it was a success in Memphis, Tenn., in Columbus and Hamilton, Ohio; in Newark, N. J., and in Brooklyn, it could be made a success in New York city, and the above announcement shows their judgment was correct.

It is not a bad omen for the New York Mutual Company to know that the stock of the Manhattan Gas Company fell from 305 to 235 as soon as it was known the Mutual Company was a fixed fact. The stock of the Mutual Company is worth nearly par, and none to be purchased at that price. Only fifty cents on the dollar have been called in and their works are nearly completed and turned over to the company.

If the citizens of Albany want cheap gas they must wake up and show some interest in the matter. Or they can remain quiet, thinking the granting an ordinance by the Common Council to the "People's Gas-Light Company," will insure competition, and wake up some future day, Rip Van Winkle like, and find the price of gas $3.75 or $4 per thousand cubic feet, instead of $2, as it has been furnished elsewhere.

Albany, Feb. 10. ANTI-HUMBUG.

Gas for Goshen.

That gas is a necessity in Goshen all have conceded for years, and all the new houses that have been built for half a dozen years have been provided with pipe in anticipation of the long asked-for gas.

A Williamsburgh firm now stands ready to erect gas works in Goshen, give them a year's trial and remove them at their own expense, if unsatisfactory, at the end of the year.

We also learn that a recent canvass has been made to secure at least fifteen hundred burners, as assurance of the support of a gas company; and we are assured that the number was very promptly obtained.

Gas, like water, always pays those who control its supply, and while we would like as a measure of public economy to see the Corporation own the gas works, we would welcome a company which would relieve us from darkness, danger and kerosene by supplying gas at a fixed and fair rate.

Will those gentlemen who took a permit or charter for gas works from our village authorities a few years ago, now take the hint, and give us more and better light?—*Goshen (N. Y.) Rep. Feb. 8.*

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—Ed.

About Tar Pavements.

Knoxville, Tenn., January 25, 1872.

Mr. Editor: If you will be kind enough to allow me, I will tell your inquiring correspondents, what I know about tar pavements. I have been waiting for some abler pen than mine to take up the subject, but in the meantime I trust these few remarks will not be out of place. I have seen many hundred yards successfully laid down; the process is simple, and yet requires some experience, to make a good pavement. The best material for the purpose is river gravel, or shingle, and where it can be procured cheap it is best to make the pavement of that alone—it will last longer; if it is not easily to be got, then gravel and cinders from the works, in equal proportion, will do very well; the largest parts of the gravel should not exceed three-quarter inch in diameter.

The material described is heated in a coke fire on the ground, and when hot is mixed with hot tar, which is kept boiling near in an iron pot; the longer the tar is boiled the harder it will be; about a gallon of tar to a bushel of stuff will do; the mixing is done in the same manner as concrete is prepared for a foundation, by throughly turning it over and over with the shovel, until every part of the material is well coated with tar; the stuff is then passed through a sieve with a mesh about ½ or ⅝ inch, and that passed through another sieve with a quarter inch mesh; the stuff is now ready for laying down. It is not necessary to make the material on the ground; it can be made at the works, for it will keep in heaps for any length of time. The next step is to prepare the ground to receive it, which is done as for a brick or stone pavement; the curbing must be in position about 2½ inches above the ground; the ground must be well rammed, solid and even, for a tar pavement is like many other things; to succeed with it it must have a good foundation. The coarser part of the stuff is put down first and rolled; a little water is sprinkled on the roller to prevent the stuff from adhering to it, then the next grade is put down, and last the fine stuff; this ought to be laid with a slight inclination to the curb, so that the water will run off. When this is done some of the finest stuff is sifted through a fine sieve, or what is better, and which gives the path a pretty appearance, procure some fine white shells, which abound in some localities, and sift them thoroughly, and then roll well until all is solid and compact, and the job is done. If your correspondents will follow these directions they will get a good pavement. The only question is—Will it pay? Here it will not pay, for I cannot procure the material, and brick is cheap; but in any place where brick and stone is expensive, and gravel abundant, it will pay to lay a tar pavement.

Respectfully, J. S.

The Mutual Gas-Light Company.

New York, February 12, 1872.

Mr. Editor: My attention has been called to a recent article in the *American Artisan*, evidently intended to create consternation and terror among the inhabitants contiguous to the works of the Mutual Gas-Light Company, foot of 11th and 12th streets, East River; and in fact, if the article was not intensly stupid, would cause the stoutest heart to quail, and the strongest mind to shrink from the contemplation of the dreadful *inferno*.

The way intended to store the naphtha at the Mutual works is practically the same as all the petroleum is now stored at the wells and depots in Pennsylvania. Heavy wrought iron tanks are used, carefully caulked and rivetted. The joints are then painted with a sal ammonium solution, which of course "rusts" them. Then the interior of the tank is covered with two coats of shellac varnish, for which the naphtha from petroleum has no affinity. At least six inches of water is kept in the bottom of the tank, so that at all times there can be no leakage of naphtha in the bottom of the tank. If the sides or top of the tank leaks it can always be seen. Now, admitting the tank leaks after all these precautions, and a perfect sea of naphtha surrounds the tank; in fact, it like a ship is riding in an ocean of naphtha, and the naphtha around the tank take fire; if there is an outlet pipe in the top of the tank for the vapors resulting from the distillation of the naphtha in the tank, the naphtha would become distilled and *no explosion* could occur, if the outlet pipe for the escape of the vapor was adequate.

What the writer of the article in question wishes to teach the public is, that when the naphtha tank becomes partially empty, the space formerly occupied by the naphtha should be filled with atmosphere, and the vapor of naphtha. Now it is absurd to argue against the fact, that all hydrocarbon vapors mixed in *proper* proportions with the atmosphere will, *when not under pressure*, if ignited, explode. That mixture must, however, be a very small proportion of vapor and a large amount of air, as no gas will explode that possesses any illuminating power. This is a well known fact, and must be accepted as an axiom.

If the article was not written in the interest of the gas companies on this island, that will be deeply injured by the introduction of naphtha gas (as they cannot live in competition with it), then it would be excessively charitable to say that the author is not posted in the way intended to make the tank absolutely safe. *The vent pipe in the top of the tank communicates with the gasholder, and no air at any time can ever get into the tank*, and it is always *under the same pressure of gas* as the gasholders.

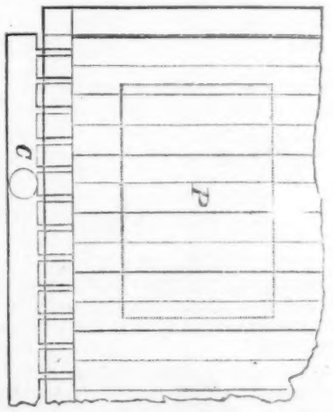
We trust the *Artisan* will explain to the terrified community that danger is not imminent, else the Life Insurance companies may injunct the gas company that intend to become the benefactors instead of the murderers of the people.

The practical good sense of the people of New York must at least lead them to the reflection, that the men representing the Mutual Company are gentlemen that have controlled the most gigantic enterprizes on this continent, whose names are a synonym of success; have carefully weighed every possible contingency that could arise, or would militate against the success of the enterprise, or check their determination to furnish the citizens of New York with the cheapest and best gas in the world. R.

On Purifying-House Cellars.

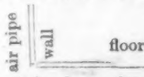
Selma, Alabama, January 27, 1872.

Mr. Editor: Your Journal of January 16th, 1872, is received. On page 21 I find the report of the explosion at the Metropolitan gas works, and one at Knoxville, Tenn. In your editorial on the subject you invite the opinions of gas engineers, and I therefore take the liberty to send you a drawing showing how I think all purifying cellars should be built to carry off the leaks, if any should take place. I propose to build into the wall, three or four-inch pipes



close up to the top of the joists, so that any gas that should escape will always find a place between the joists, and the pipe; having a draft outward, the gas will pass out of the cellar up the large pipe or chimney, C, as shown running up the wall on the outside, to give a draft. P represents the position of one of the Purifying Boxes, on the floor above the joists.

Three-inch pipes should be built in the wall close up to the floors, on top of joists. All these pipes can be made of heavy tin or iron; the chimney should be about six or eight inches in diameter. There should be six-inch pipe to top of eaves for draft pipes no frost can enter these pipes to cellars. There should be some cast-iron pipe, large, to admit air in at the cellar floor. These pipes could be put outside, with an elbow at the bottom, as shown.



I have my purifying house fitted up in this way.

I have a half-circle U-pipe made tight upon the floor, and open all over the joists on the inside of the house, and draft pipes in each corner of the room to the roof. These do away with the pipe in the wall, for if there be any gas in the cellar, it finds its way to the half-circle pipe, and passes up the draft pipe. I feel sure you will understand this, so I leave the matter for your comments.

Yours truly,
C. Collier,
Supt. Selma Gas Co.

Dr. Van der Weyde on Specific Heats.

Water has a greater specific heat than any other substance, perhaps a few solutions excepted. (For instance, a solution of cane sugar has a specific heat of nearly 1·1.)

This shows what an immense store of heat may be contained in the waters of our planet, especially the ocean, which covers about three fourths of its surface. If, then, we take into account that, for equal weights, the specific heat of air and gases is about one-fourth that of water, and that our atmosphere has only the weight of a layer of water, at most, of 34 feet, it is clear that its heat is only equivalent to that of a layer of water of 34 divided by 4, or 8½ feet high. This depth of water, therefore, is capable of storing up as much heat as the whole atmosphere; and, in giving off its heat, is able to communicate half its excess of temperature to the air, retaining the other half. Suppose, for instance, a certain portion of the Atlantic ocean to have a temperature of 80°, while the atmosphere over it is 20°; eight and one half depth of water will then be capable of heating the air 30°; bringing it to 50°, while the water itself descends 30°, also reaching 50°. No wonder, therefore, that the Gulf Stream, which continually is pouring the warm water from the tropics against the northwestern coast or Europe and its islands, modifies the climate of this part of the world to such a degree as to make it much warmer than the regions in the same latitude on the continent of Eastern Europe, Asia, or America. When we fully consider that water is about 800 times heavier than air at the ordinary pressure, it is clear that one cubic foot of water contains as much heat as 800 multiplied by 4, or 3,200 cubic feet of air, or one cubic inch of water nearly as much as two cubic feet of air.

In applying these facts to the heating of buildings, we must not, however, forget that the cold walls and objects in buildings require much more heat than the air (they have a greater specific heat), and therefore we cannot succeed in heating a room before we have brought all the objects in contact with the air to the same temperature. Applying this on a large scale again to the Gulf Stream, it is clear that west winds blowing over the same are heated to a moderate temperature, and will very soon lose this heat when passing, in winter, over the cold or perhaps frozen ground of the British Islands, France, Belgium, Holland, and the western parts of Germany. In giving them a portion of their heat they will have lost most of it before reaching Russia; wherefore the influence of the Gulf Stream does not extend beyond the lands of western Europe, which enjoy the sole benefit of the same.—*Sci. Am.*

The *Journal de l'Eclairage au Gaz*, of Paris, makes the statement that petroleum can, by a new process, which is not published, be converted into a permanent solid, which will burn without liquefying, and be preserved as a firm mass for any period of time. The question would naturally arise—What benefit greater than manufacturing candles could be derived from such a conversion, or to what other uses could it be applied, unless it were furnished cheaper than coal!

Fatal Fire at a Gas Works.

About half-past four on Monday afternoon, at the Birmingham Gas-Light and Coke Company's Gas Works, an immense stack of coke was on fire. After laboring from 5 o'clock till 10, the fire was still unsubdued, and about the latter time one of the firemen named Richard Nightengale, 24 years of age, was engaged with the hose on a ten foot wall, when a frightful accident occurred. He had placed himself on a ladder reared against the wall, which is of great thickness and supported by strong buttresses. So intense however was the heat from the huge pile of burning coke, that the wall to an extent of about forty yards suddenly gave way, and fell outwards. Nightengale was badly injured by the fall of debris, and when picked up was in such a state that it was deemed expedient to convey him to the General Hospital, where he was detained. Edwards, a fireman, who had to run to escape the fall of the bricks, on examining the mass of rubbish, saw that another body was beneath it. The bricks were removed, and a boy's head was then disclosed. Further examination resulted in the discovery of the body of a youth, whose name is at present unknown, but who assisted in working the engine. The body was frightfully mangled. The right leg was broken in several places, and so twisted and distorted that the toe of the boot on the same foot was forced into the lad's eye. The body itself was completely smashed. The fire was not under some considerable time after this, and the engine did not return till 1 o'clock yesterday morning. So vast are the heaps of coke and coal at the works, that some of them extend for a hundred yards or more, to a height of fifty or sixty feet, and hence the great difficulty of combating a fire in these huge masses.—*Liverpool Daily Courier, Jan.* 10.

The Laclede Gas Company.

The Laclede Gas Company is preparing to commence work immediately on the ground purchased on Howard and Mullanphy streets, extending to lots on the east side of the railroad track. A number of persons in the company are largely interested in similar companies in other cities, and the combination represents a large amount of capital.

The following communication has been sent to Alderman Overstolz:

OFFICE OF THE LACLEDE GAS-LIGHT CO.,
ST. LOUIS, January 30, 1872.

Hon. H. Overstolz.

Dear Sir: By request I make an official statement as to the price at which we will furnish gas as soon as our works are completed—a thing which will be accomplished within one year's time, and we hope sooner. Our maximum prices will be $3.50 per thousand cubic feet, we paying all government tax. Competition may induce lower rates, but that named shall be the maximum.

Respectfully yours,
FREDERIC CROMWELL,
Vice President.

—*St. Louis Republican, Feb.* 1.

Spontaneous Combustion.

In March last, a well-known Detroit druggist, assisted by two seriously inclined and science-loving gentlemen, resolved to make a number of experiments to test the worth of the talk about spontaneous combustion, and their experiments are well worth the attention of every reader.

They first took a piece of cotton cloth, which had once formed a part of a sheet, and which had been used until quite threadbare, and smeared it with boiled linseed oil. An old chest was placed in the loft of a store-room back of the drug store, a piece of zinc over it, another piece under it, and then the chest filled with paper and rags, and this particular piece of cloth placed in the center. Although the room was not a light one, and the weather cold, in eight days there was such a smell of fire about the trunk, and the chances were so good for a conflagration within it, that the contents were emptied.

An examination showed that the fibre of the oil-cloth had untwisted and shrivelled up, and that the rag looked as if it had been held to near a hot blaze. In April, when the rays of the sun were stronger, a pair of painter's overalls, literally covered with paint and oil, were rolled up, a handful of pine shavings placed inside, and these were crowded in next to the roof boards of the loft The experiment was not a week old when, during one warm afternoon, a smell of smoke alarmed a workman in the next room, and he found the overalls burning, and so tinder-like was the cloth that it had to be crowded into a pail of water to prevent total destruction.

During the hot weather of August, a handful of old cotton rags, in which two matches were placed, but which were not smeared with oil or other matter, were shut up in a tin box, and hung up in the loft, a rear window allowing the afternoon sun to shine directly on the box for several hours. Toward the close of the fourth day the druggist took down the box to see how the experiment was progressing, and found the contents to consist of nothing but a puff of black cinders, which flew all over him as the lid was lifted. Having a vacant corner in his brick wood-house at home, the druggist took the trunk up there, where there was no danger of burning a building. He filled the trunk with the contents of the paper rag-bag, and then smeared one with benzine and threw it in last of all. The trunk was shut tight, everything cleared away from its vicinity, and he commenced watching. One day the family came home to find a few ashes marking the place where the trunk stood, while the bricks above and around were badly stained with smoke.—*Scientific Press.*

Gas-Pipes, Sewers and Conflagrations.

A gentleman passing down Retreat avenue Monday forenoon noticed a strong smell of gas and notified some of the company's workmen, who were engaged in putting in street lamps at the lower end of the avenue. Complaint also came from several houses in the vicinity, and the foreman of the force set about ascertaining the cause of the trouble. He found a strong odor of escaping gas all along the street, and going to a convenient point began digging through the frozen ground to find the point of leakage. The drill clicked on a stone, a spark of fire flashed out, and in an instant the ignited gas exploded with a sharp report, while the fire ran along through the sewer, which was filled with escaped gas, and out through the drain-pipes into a half dozen of cellars that were filled with gas. There was a sharp explosion at No. 17 Retreat avenue, at No. 36, and at No. 44, where the explosion was very heavy. There were also subterraneous explosions at various points along the line, and fissures were rent in the earth, and in one place a heavy gutter stone, four or five feet long, was lifted out of its ordinary position and turned completely over. The explosion at No. 36 set fire to an old carpet which had been stuffed into the mouth of the open drainpipe, and caused an alarm which brought out the fire department.

At No. 17 the gas had filled the cellar before the explosion, and a cat which had been kept there, died from the effects of breathing it. A young lady who ventured into the cellar, to ascertain the cause of the trouble, was overpowered and rendered insensible for a time; and an old gentleman who rashly followed with a lighted candle had his whiskers and hair singed badly from the ignition of the gas. The windows and doors of the houses were thrown open immediately after the explosion, and at last accounts Retreat avenue was cooling off. The pipes on either end of Retreat avenue will be cut and plugged, so that the city will have gas as usual, barring Retreat avenue, which must sit in darkness.—*Hartford Post.*

Statistics of the Pennsylvania Coal Trade.

A Philadelphia *Ledger* of late date says:

"The Reading Railroad Company, which entered its business and financial year on the 1st. of December, reports a total tonnage for the week ending on the 16th, of 99,061 tons, and for its new year to the same date of 223,984 tons, against 244,675 tons to corresponding time last year—a decrease of 23,136 tons. The Lehigh Valley railroad, which also began its year of account on the 1st inst., reports a tonnage for the week ending on the 16th inst., of 73,555 tons, and for the new year to the same date 164,886 tons, against 173,860 tons to corresponding date last year—a decrease of 8,974 tons. The following named companies make their business year correspond with the calendar year, consequently continue their statements of even weeks up to the end of this month.

"For the week ending on the 16th inst. the Delaware, Lackawanna and Western Railroad Company reports a tonnage of 62,279 tons, and for the year of 1,803,273 tons, against 2,344,428 tons to corresponding time last year, showing an increase of 140,716 tons.

"The shipments by the Central Railroad of New Jersey for the week was 36,467 tons, and for the season 2,075,363 tons, against 1,872,671 tons to corresponding time last year, an increase of 203,159 tons.

"The Pennsylvania Coal Company reports a tonnage for the week of 15,282 tons, and for the year 765,544 tons, against 1,085,471 tons to corresponding date last year, a decrease of 319,926 tons.

"The Delaware and Hudson Company reports a tonnage for the week of 14,243 tons, and for the year, 1,264,695 tons, against 2,235,083 tons to the same time last year, showing a decrease of 470,388 tons.

"Adding to these reports the production of some other sources of small supply of coal, and deducting the tonnage doubled on different roads we find the anthracite tonnage for the week ending with the 16th inst., amounted to 144,895 tons, and for the year, to 15,045,594 tons, against 15,699,139 tons to the same date last year, being a decrease in the tonnage of anthracite coal of 653,545 tons.

"The production of bituminous coal for the week was 32,675 tons, and for the year 2,133,056 tons, against 1,663,023 tons to corresponding time last year—an increase of 450,033 tons. The total current year of all kinds of coal for the week was 177,570 tons, and for the year 17,178,655 tons, against 17,376,152 tons to corresponding time last year, showing a decrease of 197,497 tons.

"The trade is nearly or quite over for this season.

"At a meeting of the Board of Arbitration of the Lehigh Region, on the 20th inst., it was unanimously agreed to continue the rate of wages paid in 1871 for the year 1872.

"Coal prices are firm in all the large markets, but not quotably higher.

"A good deal of anxiety is manifested as to the next year's trade, and an interview between the W. B. A. in the Schuylkill region and the carrying companies, we understand, is appointed for to-morrow in this city. One suggestion is $2 75 as a basis for wages, sliding down to $2 25 as a minimum. It is confidently relied upon that the Reading Railroad will do its part in commanding for the region its full share of coal production for 1872."

The Pottsville *Miners' Journal* expatiates on the same topic, estimating that the yield of the anthracite coal district in year 1871 reached fifteen and a half millions of tons. For 1872, the probable produce is set down at nineteen millions of tons. Of the increased production of three and a half millions of tons, it is presumed that the market can, during 1872, take off two millions of tons, leaving a glut in n the market of one million and a half. The conclusions deduced from these figures are, that this ability to overstock the market will prevent any rise in the price of coal from the present rates; and that it would be folly in the men to demand anything beyond the prices fixed in May, 1871, viz., a basis of $2 75 sliding down to $2 25. With coal at $2 50 as a basis for labor, the *Journal* states that miners would receive $12 a week, inside laborers $10, and outside laborers $9. This, we may readily agree with the *Journal*, is "as low as labor ought to go."

Preparing Peat.

The following is one of the most recent suggestions for preparing peat for fuel: A current of superheated steam is used to heat and expel the volatile material The peat is introduced into a mixer or pug-mill surrounded with a jacket, into which the steam and vapors pass from the other portions of the apparatus, so as to warm the contents of the pug-mill, and at the same time the vapors are condensed and the water runs away. A boiler and furnace are provided, and the steam from the boiler passes through the fire-space in a pipe or coil, and acts upon the peat at the bottom of the pug-mill to blow the same, in small pieces, lumps, or in reduced form, through a pipe to the receiving vessel, and by pressure this pipe should also pass through the fire in order that the peat may be additionally heated. The action of the superheated steam is to heat the peat, and sometimes carbonize the same, so that the moisture thereof passes off as soon as it arrives at the receiving vessel, and the vapors circulate through a pipe to the jacket aforesaid surrounding the pug-mill. The peat is delivered by a piston that forces the same out of the receiving vessel through a tube or nozzle. The peat or other material may be in such a condition that, when it is heated in a closed vessel by superheated steam or otherwise, and allowed to discharge therefrom in a heated state into another vessel, the vapors will pass away from the same, and a piston is employed to force the peat out of such vessel.—*American Artisan.*

WILLIAM FARMER,

ARCHITECT AND GENERAL GAS ENGINEER,

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AN ESTABLISHED FACT.

That the Gas Screens manufactured of Oak and interlaced Rattan, will allow the *same quantity* of Lime to purify *one hundred per cent more* Coal Gas than any other Gas Screen yet invented.

Col. J. H. Armington, Superintendent of the Providence, R. I., Gas Works, says: "The amount of gas purified per bushel of Lime to this date (from September to March, 1871), is six thousand five hundred and fifty-six cubic feet." Will Superintendents please test the amount purified with other makes of Screens, and judge for themselves.

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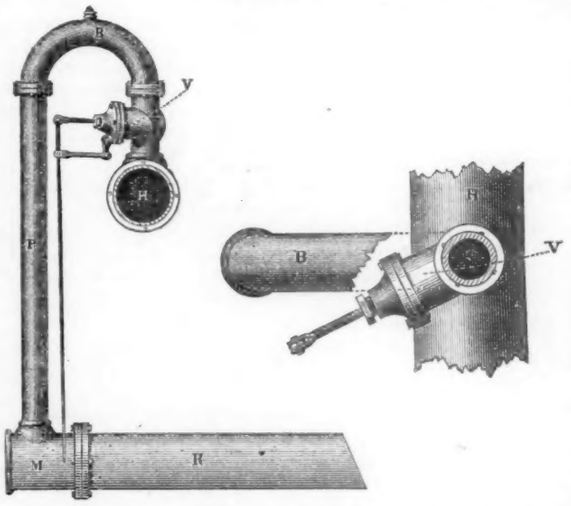

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AND

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EDITOR---PROF. HENRY WURTZ.
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☞ All communications to be addressed to "THE EDITOR, No. 42 Pine Street, Room 18, New York.

FRIDAY, FEBRUARY 16, 1872.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

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GAS WORKS IN OPERATION, ON A NEW PLAN.

Numbers of inquiries, both oral and written, relating to the subject of the following note, have lately reached us:

OFFICE OF THE NEWARK GAS LIGHT CO.
NEWARK, OHIO, January 26th, 1872.

EDITOR AMERICAN GAS-LIGHT JOURNAL: Can you advise whether the "Elmer process" described in the *Iron Age* of January 18th, as in use for lighting the Grand Central Hotel, includes the making of gas from petroleum, naphtha, and liquid hydrocarbons; and what you know of it. Yours respectfully,

WILLIS ROBBINS, Treasurer.

In accordance with the principle we have repeatedly stated to be the maxim of the present management of this Journal, to "prove all things, and hold fast to that which is good" it devolves upon us to endeavor to obtain the information desired by our friends and correspondents; and the results of our inquiries have been so important in this case that they appear to merit all the prominence we can give them.

As often said before, especially we scout the idea of some, that our methods of manufacture of gas, even from coal, are already sufficiently perfect, or that we have indeed gone much beyond the portals of the Temple of Science in this direction; and moreover especially do we flout the notions of others, that all alleged improvements should be regarded with suspicion, and treated as dangerous innovations. It is out of this latter species of fanatical intolerance, that have arisen the numerous shameful cases of persecution of scientists and inventors which stain the pages of history; and we deem it a device direct from the devil, and to be avoided accordingly. The history of our own great Art of Civilization, be it remembered, is far from stainless in this respect.

It would appear that the Grand Central Hotel, on Broadway, corner of Amity steet, one of the largest and most sumptuous of our huge palaces for travellers, consuming, say on an average sixteen thousand feet of gas per day, has been, for a number of months, and for some time past exclusively, lighted, with remarkable brilliancy and satisfaction, by the process above referred to; which is carried on in gas works erected on an adjoining block. The Company by which this enterprise has been initiated, is known as the "New York Gas Light and Heat Co.," of which the President is the Hon. G. Hilton Scribner, Secretary of State of New York; among the Directors being a gentleman of no less standing than Leonard W. Jerome, Esq., of New York City, with others of names widely known and respected.

In this present brief note, it would be premature to enter upon any attempt to convey an idea of the details of the peculiar methods used, except in so far as to say that several careful inspections of the whole fixtures and arrangements of the Works, in as many successive visits has has failed to develop any evidence of the use of naphtha or petroleum in any form; and we presume that the names given above will be admitted to furnish sufficient sanction for the belief that no such means would be suffered to be surreptitiously employed.

Our main object in this preliminary note, is to announce that there will soon be laid before the Fraternity, through our columns, and otherwise, the detailed and tabulated results of an exhaustive series of investigations of this process; in which we are assured that every known means will be used to arrive at facts and figures of interest to gas men. The materials used, and the products obtained, will all be measured, weighed, analyzed, and otherwise examined, with the most perfect instruments and methods known to science; and the records of the manufacture, for a lengthened period of time—comprising daily, and in some cases hourly observations on all these points—put into proper shape to satisfy the most critical.

More could not be done by the promotors of any new manufacturing process; and less would not be satisfactory to the Gas Fraternity, in a case like this.

LEGISLATIVE INANITY.

A new member of the Assembly from Williamsburgh has "tried his 'prentice hand" on one of the problems of the day, the legal regulation of the relations between gas producers and consumers. *Mons parturit*, and as with the mountain of old, the offspring is calculated to excite feelings of surprise, though not altogether of enthusiasm. This Hon. Gent. wants a General Superintendent of Gas, then "at least one inspector of gas in each representative district," then a "sufficient force of assistants and clerks," then—but the familiar couplet from Hudibras will serve instead of more:

Fleas have *other* fleas to bite 'em,
And *others*, these; *ad infinitum*."

All gas bills are to be paid to the Superintendent, who, after paying the above "sufficient force" and the rest of 'em, taking care not to forget himself, is to hand over any possible balance to the companies, to pay for the gas! We could not more justly characterize this curiosity of legislation than by quoting a sensible contemporary, the Brooklyn *Daily Eagle*:

"It is a waste of words to follow this farrago of absurdity. From beginning to end it does not provide for the only thing we need besides reduced price—and that is, a test of the gas, so as to provide that it shall be pure and of a proper illuminating power. This bill says nothing on this only vital point, but merely provides for a new and enormous blackmail and sinecure gang of unnecessary officials, to be fastened alike on the gas companies and the public."

By the way; what is there doing by the People of New York, or by those of them who talked so big about it in December, to secure such provisions as will put an end to the continual strife, by creating some *competent* authority to mediate in cases of dispute? Was this all froth and fury, signifying nothing? We hear of a meeting, on Feb. 5th we believe, of some twenty persons, who got up a petition to the Legislature for signatures; but what they petitioned, we cannot say. We also hear of another private meeting on the 9th, at which it is stated there was asked for a "Board of Gas Supply," to supplant the present Companies, and erect works to supply the city. A lovely kind of a "Ring," indeed! There *may* be, however, many other movements on the board, of which we are carefully kept misinformed. Will not some one, who is behind the scenes, enlighten us and our readers?

HUMAN BURNT-OFFERINGS.

"The baggage car and first coach were telescoped, and then took fire. The scene that ensued was most appalling. The unfortunate passengers were, most of them caught between the car seats, and egress from the car was nearly impossible. The flames enveloped the doomed cars almost instantly, and the passengers were left to be slowly roasted alive."

Of late we have supped so full of horrors of this kind, that this extract from the report of the latest one, at this present writing (*the last one of four in about as many days*), cannot be expected to attract more than passing attention. As in everything else, even in this, familiarity must in time breed something akin to contempt, until proba-

bly the majority of newspaper readers of the present day experience very much the same kind and amount of transient emotion as is sought for and felt by boys (and even too many girls) in reading "raw head and bloody bones" works of fiction. Those who feel like ourselves, however, take up these diurnal records of human agony with reluctance, and regard their perusal as among the necessary evils of life.

One of our dailies, referring to the late piling up of horrors, says as follows:

"The travelling public read of these things with a shudder, and then go on meekly offering themselves as possible holocausts to the spirit of corporate despotism."

The *Times*, from which we have quoted, passes on to its own practical suggestions.

First; that the cars *should not be heated at all*, involving the supposition that the amounts of suffering and death from cold would be less than those from fire; which is a question admitting of discussion, when our climate is considered.

Second; that the cars should be *heated by steam*, giving the Pacific Rail Road "Pullman cars" as an example; admitting though that in case of collision, the steam boiler and pipes "might be broken or burst," a very sensible confession of the nugatory, if not absurd, character of the proposition. The *Times* adds, however, that with "*iron cars* the danger would, in this case, be *reduced to a minimum*." We should be glad to be able to see how and why. Will the *Times* inform us? Our judgment would be that the iron car would simply be a sort of impenetrable cage or prison in which the passengers might be boiled to death by steam.

The question has occurred to us, moreover;—could an iron car be heated efficiently at all? We trow not; and have already previously pointed out that iron cars would inevitably be the coldest in winter, and the hottest in summer, and altogether the most comfortless, of all possible vehicles. The zeal of the *Times*, otherwise praiseworthy, outruns its discretion; or rather, probably, its reading of the scientific literature of the day. We have already quoted, in a former paragraph on this head (from a competent authority, the *American Artisan*), the practical judgment of engineers, founded on observation, upon iron passenger cars; namely that the necessary strength cannot be obtained without a sacrifice of the necessary flexibility and elasticity. We should hope that this conclusion might at least consign the impracticable but ever-recurring notion of iron rail-cars, to the limbo of exploded popular edlusions.

It seems almost unnecessary, certainly in case of our own readers, to refer again to our own practical solution of these difficulties, founded not only on strict science, but on extensive and costly experiments of our own, made years ago, to this very end; but for which we could never yet procure any adequate attention—namely the rendering incombustible of all the timbers of a car, throughout their whole substance (and not merely superficially), by cheap chemical agents, which will at the same time increase the strength and flexibility of the wood (so that death-dealing *splinters* can scarce accompany a collision), and render it also a *non-conductor of heat*. Years ago on account of these plans was mailed to the *Tribune* (as we have before stated), but doubtless helped to kindle the fire in the editorial grate (unless they use stoves). This was at the time of one of the earlier *Erie* holocausts.

In the mean time, so long as some measurably perfect plan, such as ours, is held in abeyance, *our* practical suggestions would be these:

Let GAS, carried compressed in cylinders, be the only fuel, as well as the only light) allowed in passenger cars; such cylinders being carried *on top* of the cars, as the least critical situation.

Let these cylinders be so provided with valves, and so connected with each other, that any individual may open any one valve singly, or all the valves at once, at any moment, and allow the gas to escape rapidly, in case of any accident.

Let a law be enforced that every express train, or through train on a line, at least, should be obliged to carry an official, who should be a regularly educated physician and surgeon, competent and provisioned for every possible emergency (in case he himself be not also a victim). It is barely possible that respectable salaries might induce medical experts of skill and standing to take the *conductorship* and entire charge of trains. Why not surgeons on such trains, as well as on passenger (and other) ships?

Let there be, among the medical stores provided, chloroform, in unstinted supplies, and even *more powerful* anaesthetics (*we* would say, even let there be some merciful *hydrocyanic acid*!), with devices, efficient and infallible, for administration thereof to victims in the midst of their tortures.

UNION PIPE FOUNDRY.

We take pleasure in publishing the following circular, which was forwarded to us:

OFFICE OF DENNIS LONG'S FOUNDRY.
TO OUR FRIENDS AND CUSTOMERS.

We send you herewith copy of daily paper, containing some particulars of the destruction by fire of our largest Pipe Works. The report of the loss and damage is *very much exaggerated*. These works were built at a large outlay of time and money, and in the opinion of "judges" were fire proof. They were especially so, and only a combination of misfortunes and extraordinary delays in obtaining and applying the customary protections from fire, were able to destroy them. We are now at work with a large and ample force preparing the buildings and machinery for a resumption of work, and in a few days will be casting pipe in *this* foundry, and with an increased capacity. Our two other foundries, distant from the large shops, remain intact and are daily running as usual, casting pipe. There will be no delays in our completing as agreed, all outstanding contracts, and we are also prepared to fill orders as heretofore. Our *capacity is only temporarily decreased*. We have in no case stopped. We respectfully ask a continuance of your favors and orders, promising our best attention to the same.

DENNIS LONG, Proprietor.
SAMUEL A. MILLER, Business Manager.
DENNIS LONG, JR., Superintendent.
LOUISVILLE, Jan. 22, 1872.

Magnus Ohren's "Advantages of Gas for Cooking, Etc."

Those of our Correspondents who have been led by our editorial notice to ask us how to obtain copies of this work, (Mr. Humphreys of Lansingburgh, for example) have their answer in an advertisement on this same page, which has just been sent us by Mr. Ohren. On this topic we shall soon enlarge again, lacking room now.

Smith & Ellis,
IRON FOUNDRY & PIPE WORKS,
Philadelphia.

SEVERAL THOUSAND 3, 4, AND 6 INCH CAST IRON GAS PIPES ON HAND, FOR IMMEDIATE DELIVERY.

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THE ADVERTISER HAVING HAD MANY YEARS EXPERIENCE in Designing and Erecting Gas Works, and in the Manufacture of Gas, is open to an engagement. He understands keeping the Working Accounts of a Gas Works. Address MONUMENTAL, office of this Journal. 291-3t

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On the Advantages of Gas for Cooking and Heating:

BY MAGNUS OHREN, A.I.C.E.,
Secretary of the Crystal Palace District Gas Company, Lower Sydenham, London, S.E.

NOTICES ON THE FIRST EDITION.

"This Pamphlet, which we have read carefully, is calculated to convince the most sceptical as to the saving to be effected from the use of gas for the purposes advocated by the author, whose well-known reputation as a scientific engineer stamps his opinions on the subject with a high value. In this instance, moreover, details and proof are cited which render his position impregnable, and entirely remove theories into the domain of facts."—"*The Freemason*," *28th October*, 1871. Little Britain, London, E. C.

ALLIANCE AND DUBLIN CONSUMERS GAS CO.,
DUBLIN, 30th October, 1871.

My Dear Sir: You have brought out a first rate little book. Many thanks for sending me a copy. You have gathered a great amount of information into little space.

I am yours faithfully,
Magnus Ohren, Esq. J. SOMERVILLE.

Intended for distribution by Gas Companies to their Consumers. A copy direct from the author by post for 25 cents United States currency. Address Lower Sydenham, London, S. E. 291-unl

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GEORGE R. TUTTLE, Proprietor,
Cleveland, Ohio.

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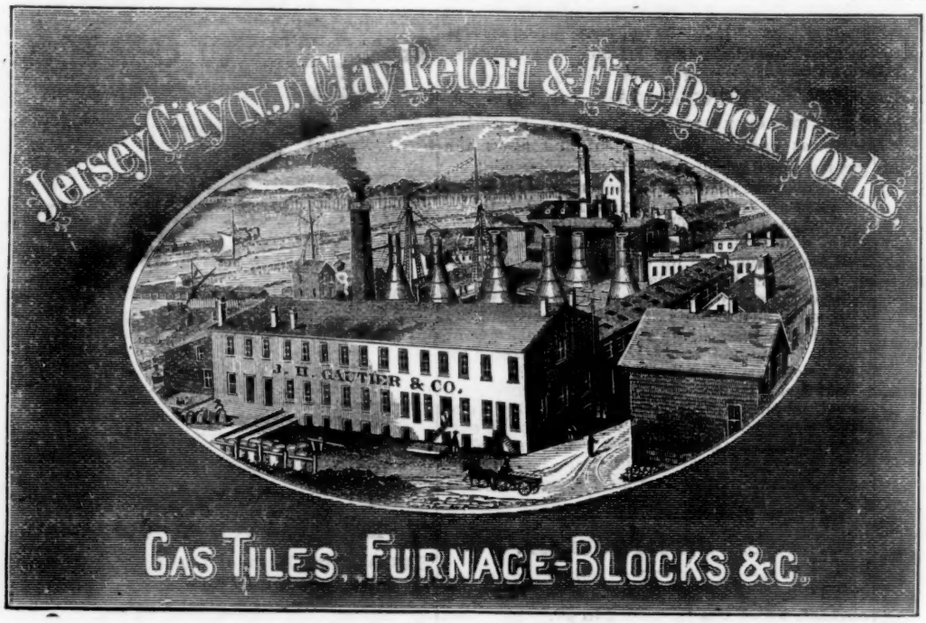

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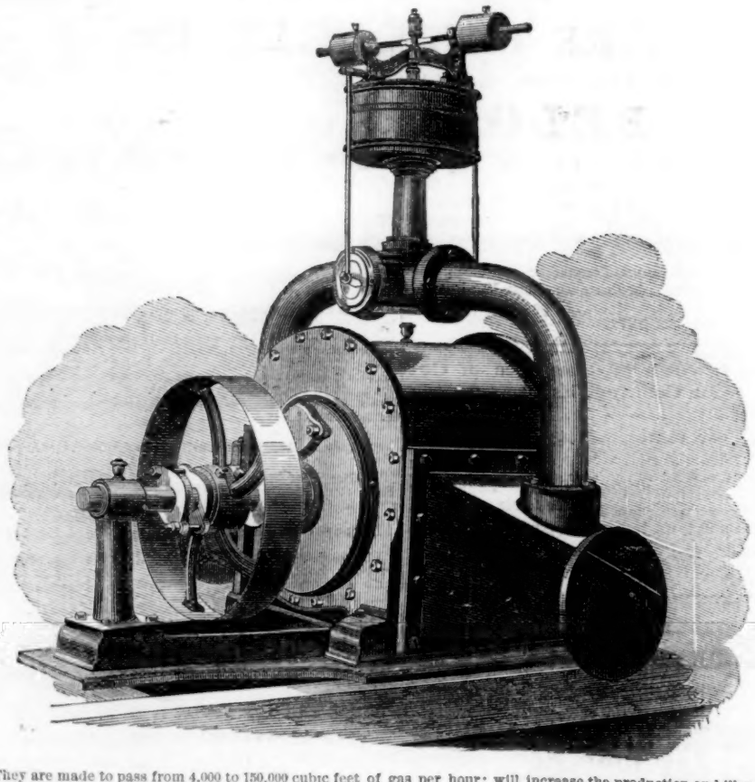

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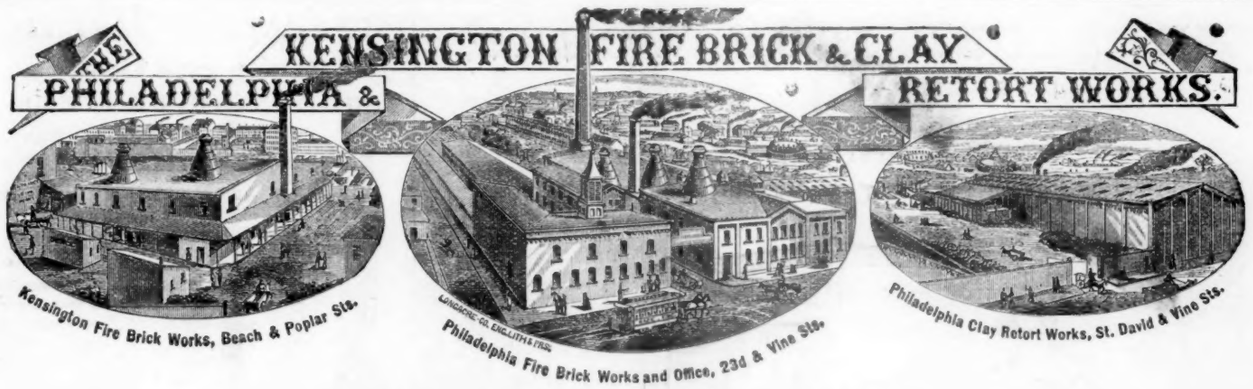
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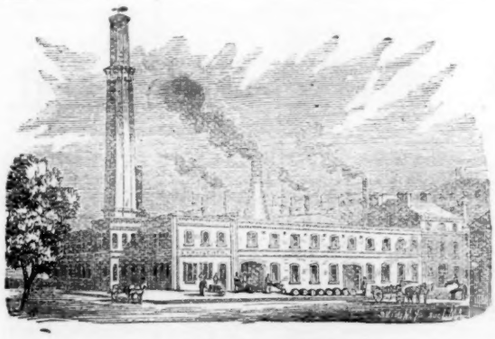

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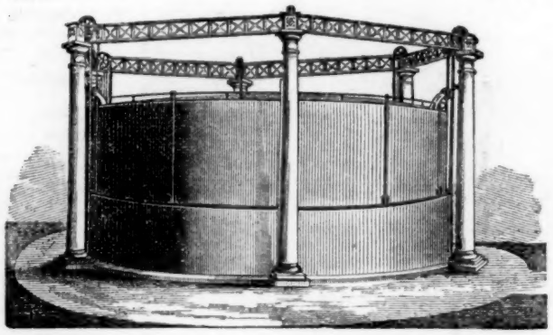

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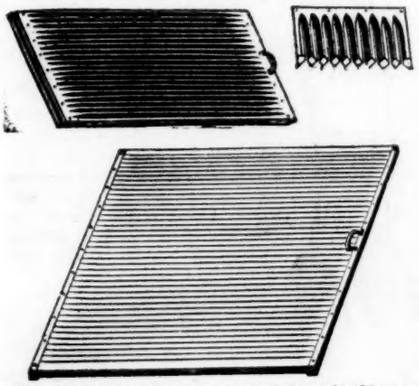

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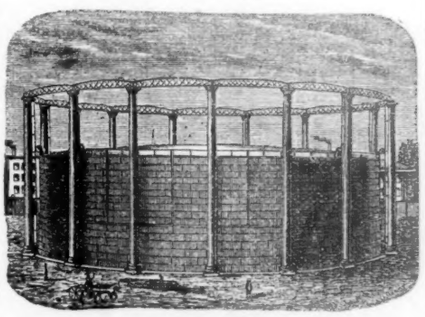

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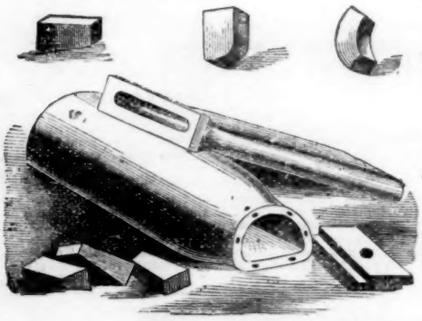

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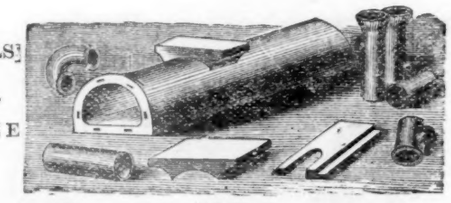

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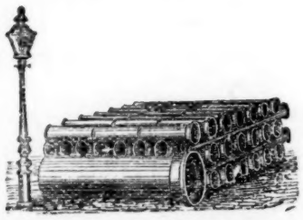

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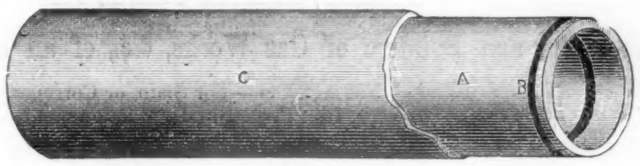

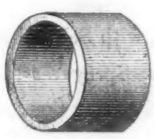

FIG. 2.

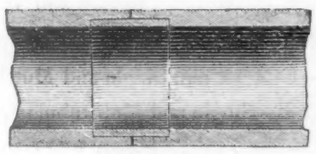

FIG. 3.

A—Cylinder of Wood. **B**—Band of Iron. **C**—Coating of Hydraulic or Asphaltum Cement.

FIG. 2.—Thimble for Connection. FIG. 3—Horizontal Section and Connection.

Above is a cut of the

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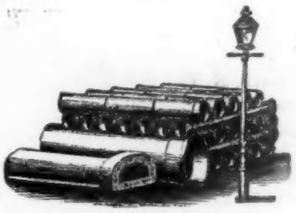

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